M17/4/SPEXS/SP3/ENG/TZ0/XX/M

Markscheme

May 2017

Sports, exercise and health science

Standard level

Paper 3

18 pages

Subject Details: Sports, exercise and health science SL paper 3 markscheme

Mark Allocation

Candidates are required to answer **ALL** questions from two of the options **[2×20 marks]**.
Maximum total = **[40 marks]**.

Markscheme format example:

Question			Answers	Notes	Total
5	c	ii	this refers to the timing of the movements ***OR*** the extent to which the performer has control over the timing of the movement✓ external paced skills are sailing/windsurfing/receiving a serve✓ internal paced skills are javelin throw/gymnastics routine✓		**2 max**

1. Each row in the 'Question' column relates to the smallest subpart of the question.

2. The maximum mark for each question subpart is indicated in the 'Total' column.

3. Each marking point in the 'Answers' column is shown by means of a tick (✓) at the end of the marking point.

4. A question subpart may have more marking points than the total allows. This will be indicated by '**max**' written after the mark in the 'Total' column. The related rubric, if necessary, will be outlined in the 'Notes' column.

5. An alternative wording is indicated in the 'Answers' column by a slash (/). Either wording can be accepted.

continued…

6. An alternative answer is indicated in the 'Answers' column by '***OR***' on the line between the alternatives. Either answer can be accepted.

7. Words in angled brackets ‹ › in the 'Answers' column are not necessary to gain the mark.

8. Words that are underlined are essential for the mark.

9. The order of marking points does not have to be as in the 'Answers' column, unless stated otherwise in the 'Notes' column.

10. If the candidate's answer has the same "meaning" or can be clearly interpreted as being of equivalent significance, detail and validity as that in the 'Answers' column then award the mark. Where this point is considered to be particularly relevant in a question it is emphasized by *OWTTE* (or words to that effect).

11. Remember that many candidates are writing in a second language. Effective communication is more important than grammatical accuracy.

12. Occasionally, a part of a question may require an answer that is required for subsequent marking points. If an error is made in the first marking point then it should be penalized. However, if the incorrect answer is used correctly in subsequent marking points then **follow through** marks should be awarded. When marking, indicate this by adding **ECF** (error carried forward) on the script. 'ECF acceptable' will be displayed in the 'Notes' column.

13. Do **not** penalize candidates for errors in units or significant figures, **unless** it is specifically referred to in the 'Notes' column.

Option A — Optimizing physiological performance

Question			Answers	Notes	Total
1.	a		experimental group ✓ 80 % ‹VO_2 max› ✓		2
	b		0.5 – 0.1 ✓ 0.4 mg cm^{-2} min^{-1} ***OR*** 0.1 – 0.5 ✓ –0.4 mg cm^{-2} min^{-1}	*Units not required for marks.*	2
	c		greater sweat rate with increased exercise intensity ✓ greater sweat rate for experimental group ✓ greater sweat rate in post-training condition when exercising for both experimental groups ✓		2 max
	d		increased plasma volume ✓ earlier onset of sweating ✓ increased sweat rate ✓ a more dilute sweat composition ✓		2 max

Question			Answers	Notes	Total
2.	a		36 – 38 degrees Celsius / 97 – 99 Fahrenheit ✓		1
	b		*Dehydration:* if a person becomes dehydrated sweat mechanism is impaired ✓ *Thermoregulatory failure:* low fluid levels in the body impair sweating ✓ *Disorientation / twitching / seizures / coma:* dizziness and fainting results from reduced blood flow to the brain ✓ heat causes an increase in blood flow to the skin and pooling of blood in the legs, which can lead to a sudden drop in blood pressure ✓ feeling of light-headedness before fainting occurs ✓ *Lack of sweating:* occurs to preserve fluid levels ✓ dangerously high core temperature ‹greater than 40 °C› results ✓		2 max

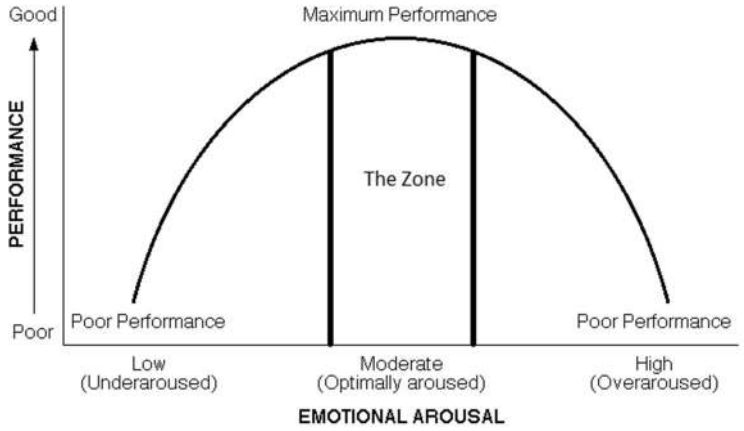
Question			Answers	Notes	Total
3.	**a**		an ergogenic aid is any substance or phenomenon that improves an athlete's performance ✓		**1**
	b		*Cardiovascular:* decreased HDL cholesterol / Increased LDL cholesterol / cardiac hypertrophy / increased risk of coronary heart disease / increased risk of heart attack ✓ *Liver:* liver toxicity / liver cancer ✓ *Psychiatric:* mood changes / increased aggression / depression/dependence & addiction ✓ reproductive and hormonal changes for males and females ✓		**2 max**
	c		improve performance by blocking noradrenaline/reducing stress ✓ reduce heart rate which can improve hand steadiness and performance in fine motor skills ✓ improved precision and accuracy in fine motor skills which is crucial in sports such as archery / shooting ✓ reduced symptoms of anxiety ‹*eg*, hand tremors› ✓	*Award **[1 max]** for list.*	**3 max**

Question			Answers	Notes	Total
4.			reduced level of performance due to overload on body ✓ increase in <u>resting</u> heart rate as altered resting heart rate results from increased metabolic rate responding to imposed demands of training ✓ <u>chronic</u> muscle soreness is a sign that muscles aren't recovering appropriately ✓ reduced immune function continual catabolic state ✓ sleep disturbance combination of nervous system and or hormonal system overload ✓ fatigue associated with insomnia ✓	*Award **[1 max]** for list.* *Accept alternatives as appropriate if provided with explanation.*	**3 max**

Option B — Psychology of sport

Question			Answers	Notes	Total
5.	**a**		4.60 /±1.84 / females for item 1 ✓		**1**
	b		5.16 – 4.39 ✓ = 0.77 ✓ ***OR*** 4.39 – 5.16 ✓ = –0.77 ✓		**2**
	c		*Similarities* for both, item 3 has the highest score ✓ for both, item 2 has lowest score ✓ *Differences* males always have higher scores than females ✓ females always have lower scores than males ✓ difference between 2 and 3 much greater in males / less in females ✓	*Award **[1 max]** for similarities and **[1 max]** for differences.*	**2 max**
	d		refers to behaviour driven by external rewards ✓ monetary reward / prizes ✓ trophy ✓ praise from others ✓ popularity/status/fame ✓		**3 max**

Question			Answers	Notes	Total
6.	a		those ‹relatively› stable and enduring aspects of individuals which distinguish them from other people, making them unique ‹but at the same time permit a comparison between individuals›. ‹Gross, 1992› ✓	*OWTTE*	1
	b		personality / behaviour is due to interaction between the person and their environment ✓ personality can be modified as the person responds to environmental situations ✓ experiences cannot be understood if personal and situational factors are separated ✓ genetic and environmental influences are intertwined ✓ the interaction of cognitive factors with environmental situations results in the expression of personality ✓ personality traits can be used to predict behaviour ‹in some situations› ✓		3 max

Question			Answers	Notes	Total
7.	a		 the hypothesis states that the initial stage of the graph sees increasing arousal indicating increasing attention and interest ✓ optimal arousal and optimal performance are indicated at the peak of the graph ✓ performance declines with increased arousal beyond the peak of the graph ✓ performance declines with decreased arousal beyond the peak of the graph ✓ some sports are performed best at low arousal. *ie* those that require precision, fine motor movements ✓	*Marks can be awarded for a fully annotated graph.* *Accept any of the marking points if displayed in an annotated diagram.*	**3 max**
	b		can be used to inform interventions / monitor progression ✓ simple to administer / can be scored / interpreted quickly ✓ more than one athlete can conduct the test at one time ✓ easy to generate a large amount of data ✓ affordable / cost effective ✓ specific to sport ✓		**2 max**

Question			Answers	Notes	Total
8.			developing psychological skills involves three phases: general education phase, acquisition phase, and practice phase ✓ education phase: the athlete learns about the importance of psychological skills and how they can affect performance ✓ acquisition phase: the athlete learns about the strategies and techniques to improve the specific psychological skills that they require ✓ practice phase: the athlete develops their appropriate psychological skills through repeated practice, simulations and actual competition ✓ is not a quick fix ✓ not only used by elite / problem athletes ✓ *Examples of PST interventions:* goal setting involves setting outcome / performance/process goals ✓ setting effective goals involves using the SMARTER process (Specific, Measurable, Achievable, Realistic, Time-based, Exciting, Review) ✓ mental imagery involves using all the senses to create an experience in the mind and has been shown to enhance motor task performance ✓ thought stopping / concentration / distraction techniques ✓ relaxation techniques help athletes to cope with anxiety and pressure situation and include progressive muscle relaxation/ breathing techniques/ self-talk techniques ✓	*Award **[1 max]** for example of PST interventions.*	**3 max**

Option C — Physical activity and health

Question			Answers	Notes	Total
9.	**a**		1986 ✓		**1**
	b		150 – 50 ✓ = 100 ✓ ***OR*** 50 – 150 ✓ = –100 ✓		**2**
	c		*Similarities* B and C both decrease slightly from 1990–1992 / decrease from 1992–1994 / show a maximum in 1992 ✓ *Differences* A always higher than B/C ✓ C is always lower than A/B ✓ A is lowest in years when B/C highest ✓ A increased between 1992-1994 while B and C decreased ✓	*Award **[1 max]** for similarities and **[1 max]** for differences.*	**2 max**
	d		damage to arteries ✓ atherosclerosis is accumulation of fat/cholesterol/other substances in the walls of the arteries ✓ atherosclerosis can cause a narrowing of the arteries ✓ atherosclerosis can lead to formation of plaque ✓ disrupts the blood flow which can lead to the formation of blood clots ✓ atherosclerosis is a major cause of CHD and stroke ✓ allows LDL cholesterol to accumulate ✓		**3 max**

Question			Answers	Notes	Total
10.	**a**		disease associated with sedentary / physical inactivity ✓		**1**
	b		modern life has evolved from rurally based farming practices to initially urban based industrial activity and now urban based office / sedentary lifestyle ✓ technology has reduced levels of labour/physical activity *eg* motor car / electricity / electrical appliances / computer games *eg* washing machine ✓ reduced levels of physical activity increases incidence of some forms of cancer / type II diabetes / osteoporosis/obesity / musculoskeletal issues/mental health issues ✓ work expectation ‹24/7› has reduced opportunity for physical activity ✓ availability of fast food at relatively low cost has contributed to a poor diet, high in fat / sugar ✓		**3 max**
11.			energy intake < energy expenditure = weight loss ✓ athletes in training require a higher energy intake ✓ a reduction in energy intake will lead to a reduction in metabolic rate and hence energy expenditure ✓ energy expenditure is a combination of basal metabolic rate ‹BMR› and physical activity ‹to lose weight energy expenditure must be greater than energy intake› ✓		**2 max**

Question			Answers	Notes	Total
12.	**a**		*WHO guidelines:* adults should do ‹at least 150 minutes of› moderate-intensity aerobic physical activity throughout the week or ‹do at least 75 minutes of› vigorous-intensity aerobic physical activity throughout the week or an equivalent combination of moderate and vigorous intensity activity ✓ aerobic activity should be performed in bouts of at least 10 minutes duration ✓ muscle strengthening activities, involving major muscle groups, should be done on 2 or more days a week ✓		**3**
	b		obesity *eg*, often linked with high fat diet ✓ physical inactivity *eg*, often linked with obesity ✓ diet high in saturated fat *eg*, often linked with obesity ✓ family history *eg*, there is a genetic predisposition to type 2 diabetes ✓ high prevalence in some ethnic groups *eg*, Pima Indians living in southern Arizona and those of South Asian decent *eg*, India, Bangladesh, Pakistan ✓	*An explanation of risk factors required.*	**3 max**

Option D — Nutrition for sport, exercise and health

Question			Answers	Notes	Total
13	a	i	low CHO / ‹diet› A ✓		1
		ii	low CHO / ‹diet›> A ✓		1
	b		5 – 3.5 ✓ = 1.5 ‹kg› ✓ ***OR*** 3.5 – 5 ✓ = –1.5 ‹kg› ✓		2
	c		*Similarity* high carbohydrate diet pre and post training same body weight ✓ *Difference* low carbohydrate diet yields reduced body weight ✓		2
	d		lower body fat is associated with better improved endurance performance ✓ higher relative fat free mass is associated with improved endurance performance ✓ lower absolute body mass is associated with improved endurance performance ✓ athletes who have ectomorphic characteristics/lean with long legs tend to perform well in endurance activities ✓		2 max

Question			Answers	Notes	Total
14.	**a**	**i**	*Mouth:* 5.5 to 7.5 ✓		**1**
		ii	*Small intestine:* 6.0 to 8.0 ✓		**1**
	b		enzymes are a class of proteins that support biochemical reactions / speed up/catalyse reactions ✓ enzymes are secreted by salivary glands/ stomach / pancreas / liver / small intestine ✓ digestive enzymes are essential for the breakdown of carbohydrates / fats / proteins into small absorbable molecules ✓ digestive enzymes are secreted in an inactive form and are only activated at the site of function to protect the secretion organs from any damaging, premature enzymatic action ✓ enzymes work most efficiently when the environment is optimal in temperature ‹37 °C› and pH value ✓ without enzymes the process of digestion would be a long and inefficient process, with energy not being supplied at an appropriate rate ✓		**4 max**

Question			Answers	Notes	Total
15.	a		increases muscle creatine content, facilitates rapid PCr resynthesis in the rest periods during repeated high intensity exercise ✓ creatine ingestion may also augment the effects of training by stimulating muscle anabolism ✓ recommended dosage 15–20 g per day for 4–7 days followed by a maintenance dosage of 2 g per day ✓ benefits exercise that relies on the PCr energy system such as strength, power and sprinting sports ✓		**2 max**
	b		fat present in fat storage cells adiposites contains no water as such overweight people have a large proportion of body mass made up of tissue containing little water ✓ trained person has more muscle and less fat and therefore athletes bodies have greater percentage of body water ✓ fat free tissue comprised 60–80 % water ✓ trained person has improved temperature regulation ‹sweats more easily› ✓ 45% water in body is extracellular ‹plasma, lymph, saliva› trained individual ✓ 55% water in body is intracellular in trained individual ✓ trained individuals have increased metabolism requiring greater water ‹storage› requirements ✓		**4 max**